FORCES IN BIOLOGY

CHIARO NANOINDENTER
MEASURE & APPLY FORCES ON BIOLOGICAL SAMPLES

PICO-NEWTON FORCE RESOLUTION

EXPLORE MECHANICS OF CELLS AND SOFT SAMPLES

MICRO-SCALE CONTACT AREA
DESIGNED FOR CELLS AND MICROMATERIALS

Are you curious about the mechanical behaviour of cells, spheroids or other small objects? Do you work with soft or biological materials that are challenging to characterize?

The Optics11 Chiaro Nanoindenter is purposely built to enable researchers to apply and measure forces on small objects while placed on an inverted microscope. To assess living samples the Chiaro can measure samples in near physiological conditions.

The Chiaro is designed as a compact yet powerful device compatible with almost any inverted microscope. You can now start to explore force-biology relations in your own lab!
APPLICATIONS

Apply & measure forces on:

- Isolated cells
- Cell layers and sheets
- Cells on micropatterns or pillars
- Microparticles/capsules/droplets
- Histology sections
- 3D printed microstructures

Ask us if we can accommodate your application needs!
EXPLORE THE MECHANICS OF CELLS AND MICROMATERIALS
TECHNOLOGY

The fiber-optical interferometric MEMS technology developed by Optics11 makes it possible to measure even the softest materials with high force resolution in a non-destructive manner, even while immersed in liquids. Our unique and patented force sensors are easy to use and re-usable.

The Chiaro instrument is designed for use in biology labs, where a need for usability, throughput and reliable results meet complex soft samples and challenging measurement conditions. The Chiaro meet these challenges and provide results that help you better understand the mechanical behaviour of your materials.

The Chiaro can analyse mechanics of any sample type or shape: from sub-micron films or cells to intact cell sheets or 3D-printed microstructures. Measuring in liquid allows for measuring in-vivo-like conditions, or place the Chiaro in a microscope enclosure ensure sample survival when performing studies over longer time spans.
INSTRUMENT FEATURES

Being mounted independently, the Chiaro can be combined with almost any inverted microscope, from standard bright-field, fluorescence and confocal to home-built microscopes!

Key features of the Chiaro include:

- Match with any inverted microscope
- Easy to learn and master
- Pre-calibrated probes
- Apply & measure extremely low forces
- Direct data & result output
- Customizable displacement/load/indentation profiles
- Micro-DMA (dynamic mechanical analysis) capability
- Automatic find-surface function
- Small footprint
- Little to no maintenance required
- Low-cost, high performance
### TECHNICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Probe</th>
<th>System</th>
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<tbody>
<tr>
<td><strong>Stiffness range</strong></td>
<td>0.02 N/m up to 100 N/m</td>
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<td><strong>Force range</strong></td>
<td>20 pN – 2 mN</td>
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<tr>
<td><strong>Practical noise level</strong></td>
<td>1 nm</td>
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<tr>
<td><strong>Young’s modulus range</strong></td>
<td>1 Pa up to 1 GPa</td>
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<td><strong>Probe material</strong></td>
<td>Glass</td>
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<tr>
<td><strong>Indenter dimensions</strong></td>
<td>120 x 150 x 280 (mm, WxLxH)</td>
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<tr>
<td><strong>Modes of operation</strong></td>
<td>Displacement, Load, Indentation</td>
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<tr>
<td><strong>Dynamic frequency range</strong></td>
<td>0.1 – 10 Hz</td>
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<tr>
<td><strong>Displacement stroke</strong></td>
<td>20 µm / 100 µm</td>
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<tr>
<td><strong>Lateral scan range</strong></td>
<td>12 x 12 mm</td>
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<tr>
<td><strong>Minimum lateral pitch</strong></td>
<td>&lt;1 µm</td>
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<tr>
<td><strong>Output signal bandwidth</strong></td>
<td>20 kHz (linear)</td>
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### Software
- Data acquisition rate
- In-software analysis models
- Raw data format
- Displ./load/indentation profile
- Calibration

### Options
- Dynamic module
- Inverted camera module
- Temperature control
- Load, indentation & DMA control
- 10X inverted or side-view camera
- Ambient – 60°C

### Maintenance
- Probe
- System
- Demi-water
- Iso-Propylalcholohol (IPA)
- Other common solvents
- Annual checks

- Young’s Modulus (E)
- Storage / Loss Modulus (E’ / E”)
- Tan-delta
- .CSV, .BMP
- Fully customizable
- Automatic / Pre-calibrated
- 1 Hz – 16 kHz
ENABLING GROUNDBREAKING RESEARCH WITH CUTTING-EDGE TECHNOLOGY
ABOUT OPTICS11

Optics11 is a fast-growing high-tech company that offers revolutionary new optical fiber measurement systems. Our measurement systems find applications in many fields, from life science research to industrial process monitoring.

We love making cutting-edge technology fit for use!

Our mission is to apply state-of-the-art technology to develop high-performance yet cost-effective instruments that advance science worldwide.

Please contact us at info@optics11.com for more information, technical data sheets, or to speak with a representative about your specific needs.